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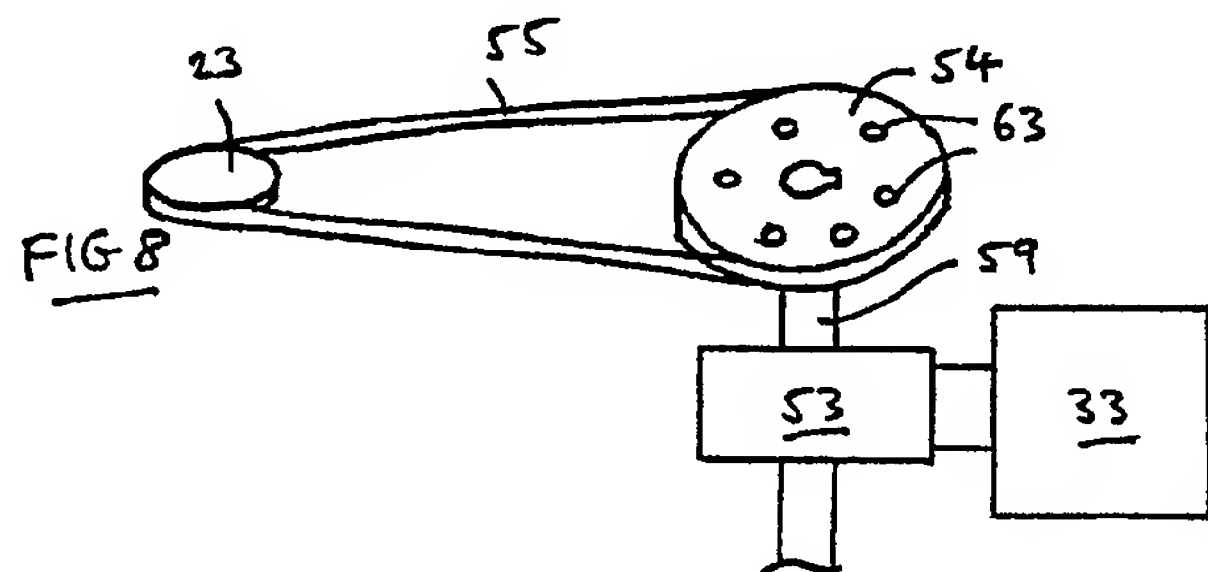
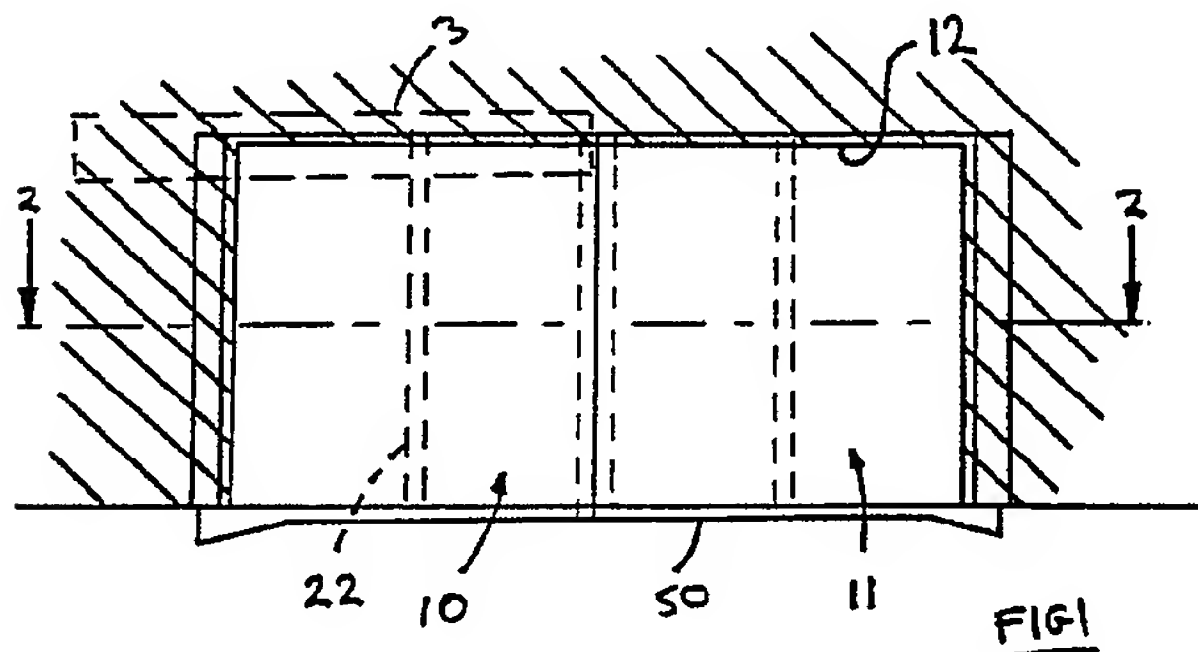
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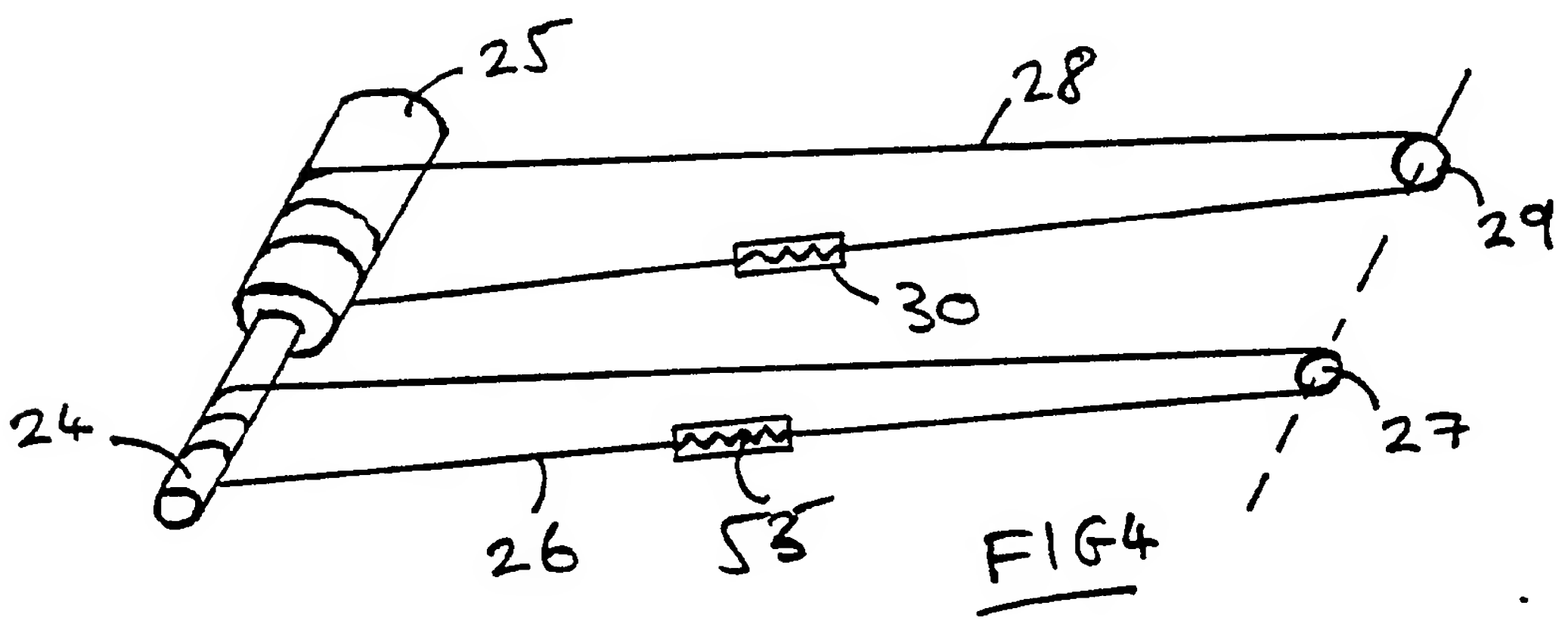
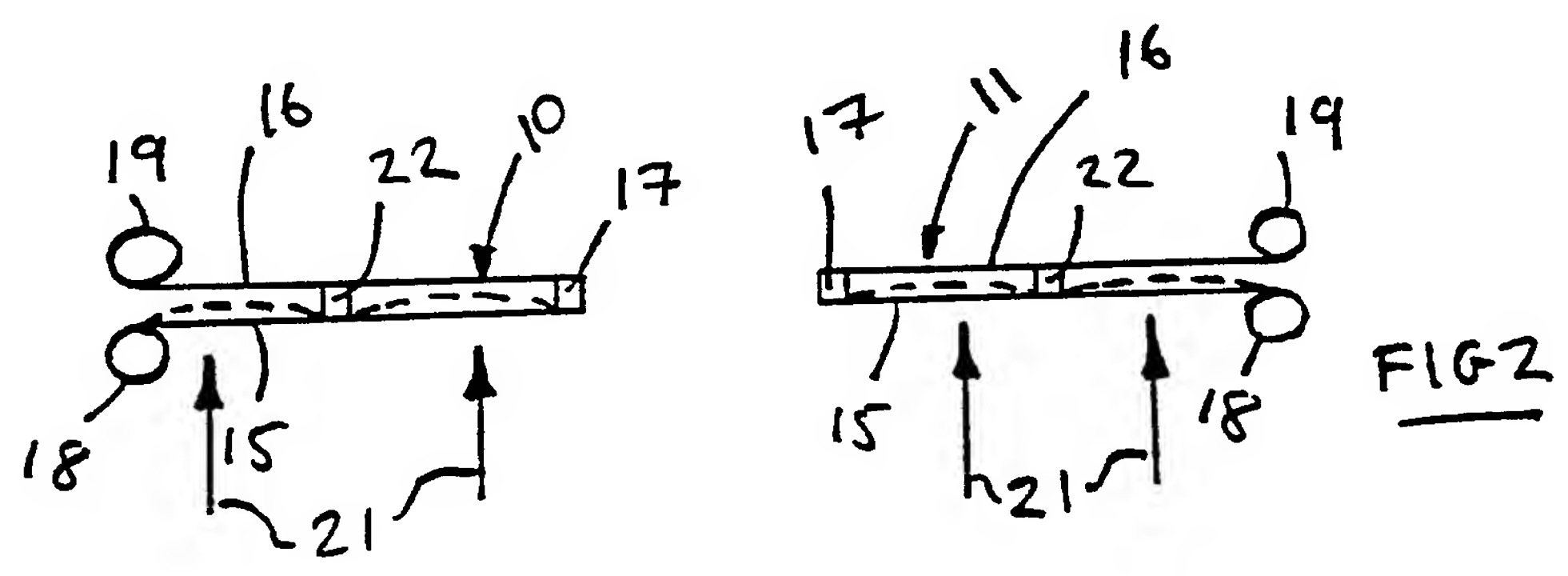
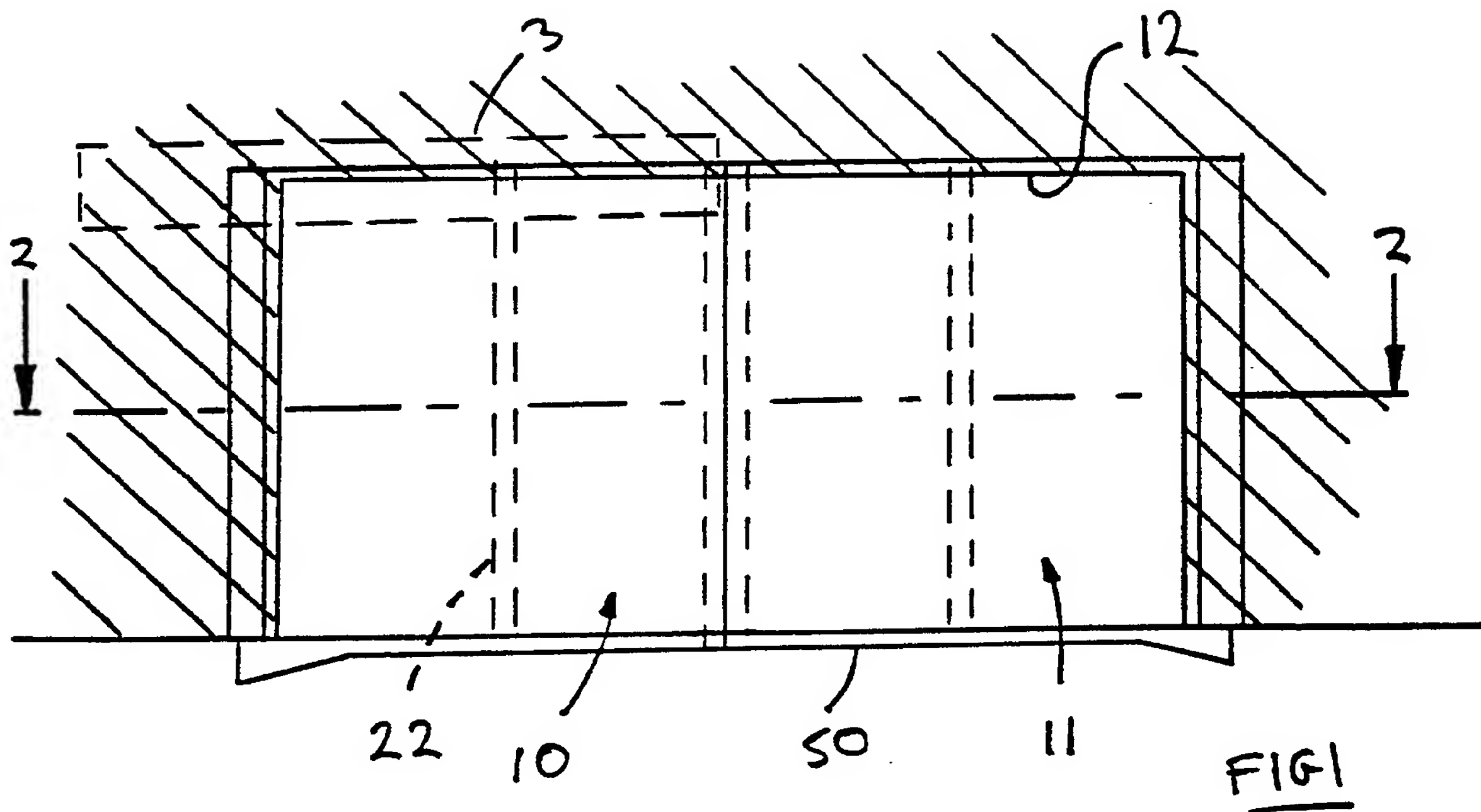
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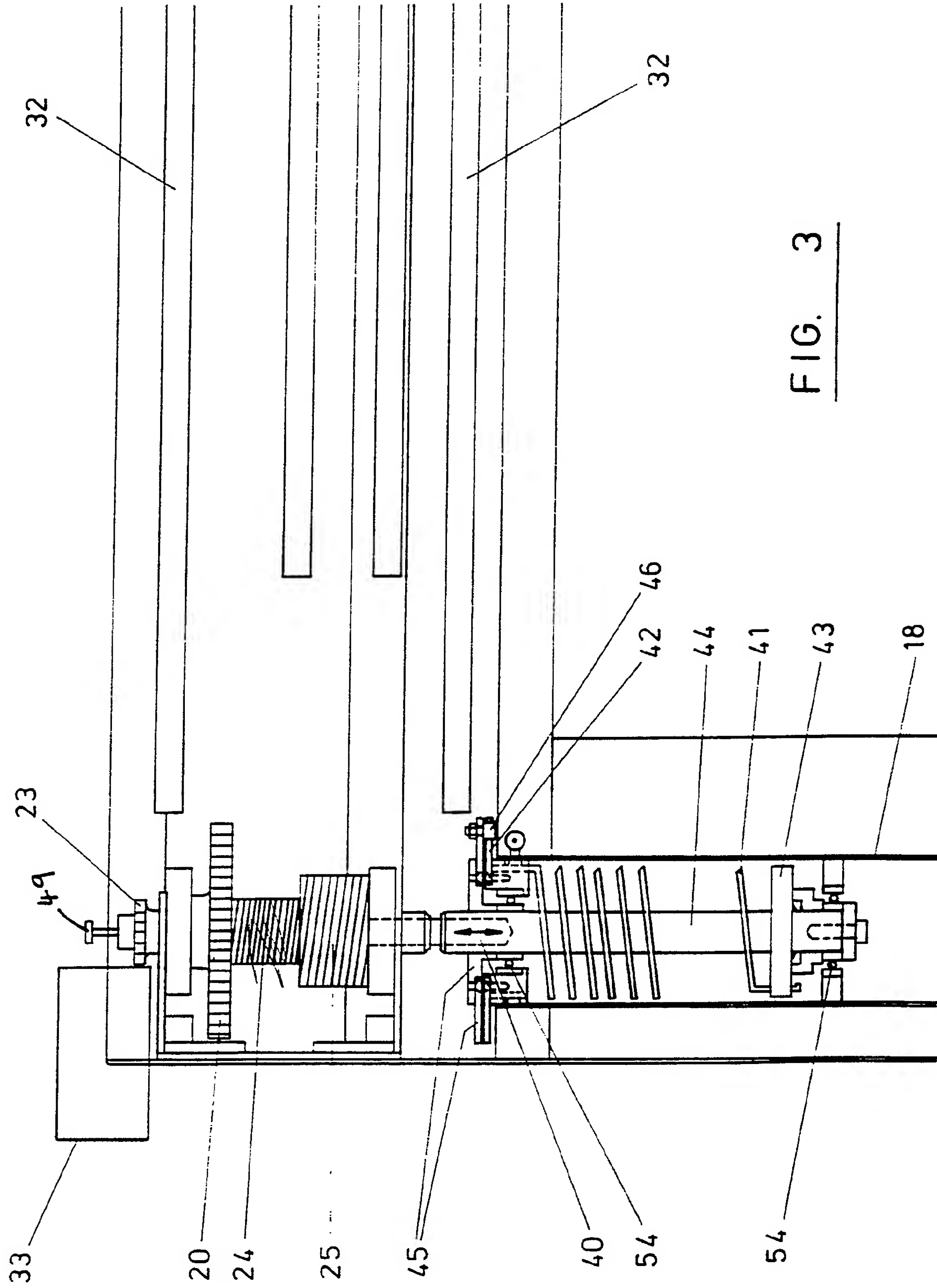
(54) Flexible doors

(57) Door panels 10, 11 each comprise a pair of spaced flexible members (15, 16, Fig.2) which are wound onto and pulled off drums by an operating motor 33 in order to open and close the door panels 10, 11. If power to the operating motor 33 fails then a drive sprocket 54 may be disconnected from a gearbox 53 so that the flexible members may be wound onto the drums to at least partially open the door panels 10, 11. The force of winding the flexible members may be provided by a spring force within the drums causing rotation of the drums or from a weight falling downwardly or manually by pushing the door panels 10, 11 apart. The method of disconnecting the drive sprocket from the gearbox may also comprise a weight falling downwardly which operates a lever to disconnect a clutch mechanism.



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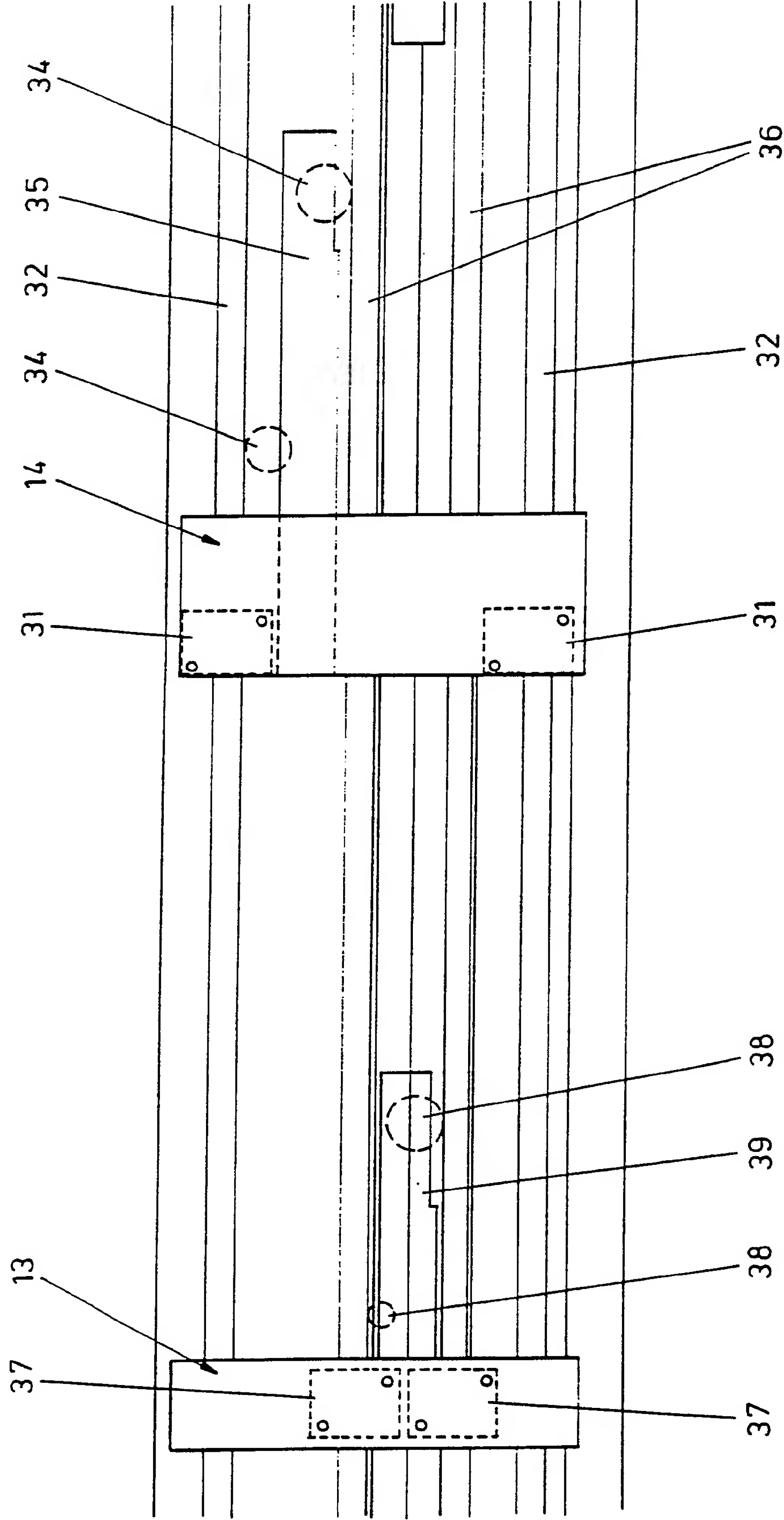


FIG. 5

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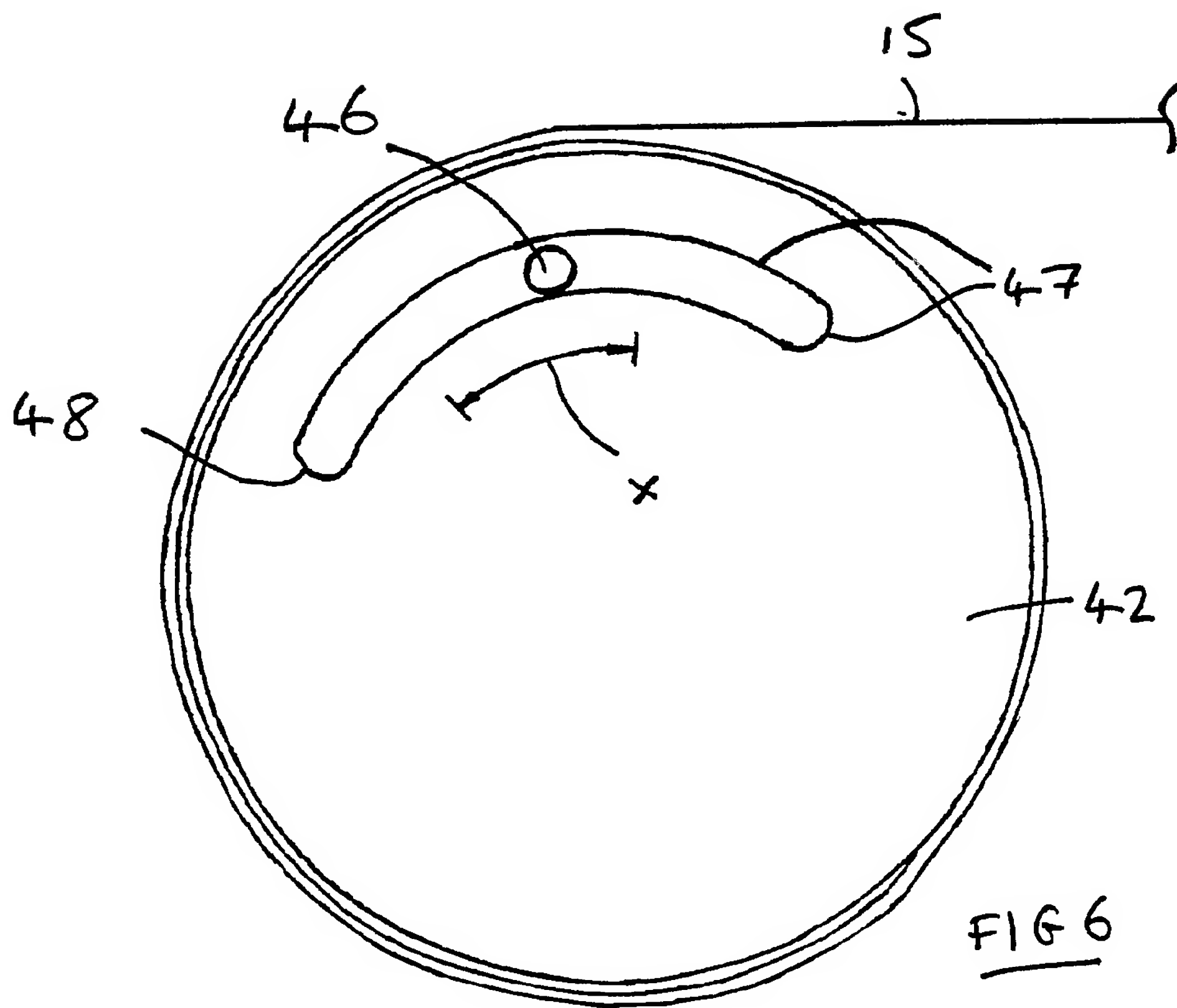
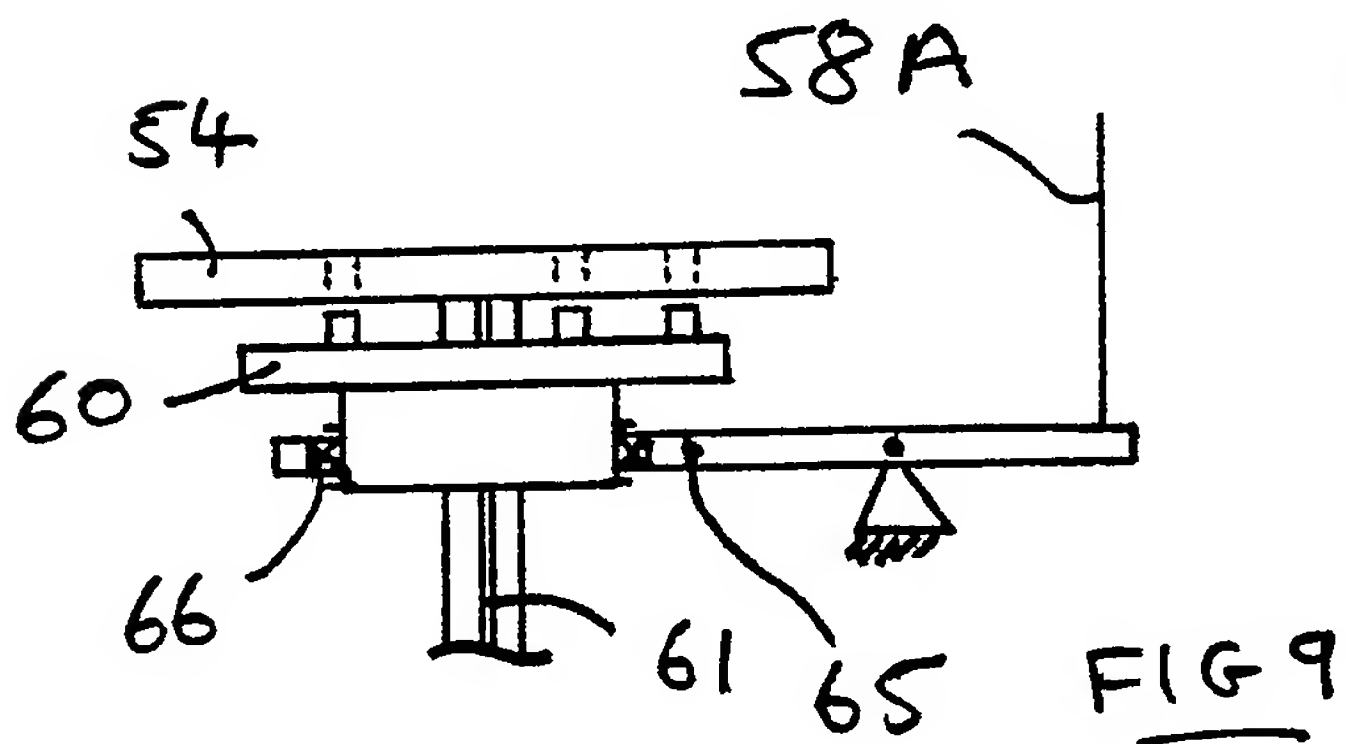
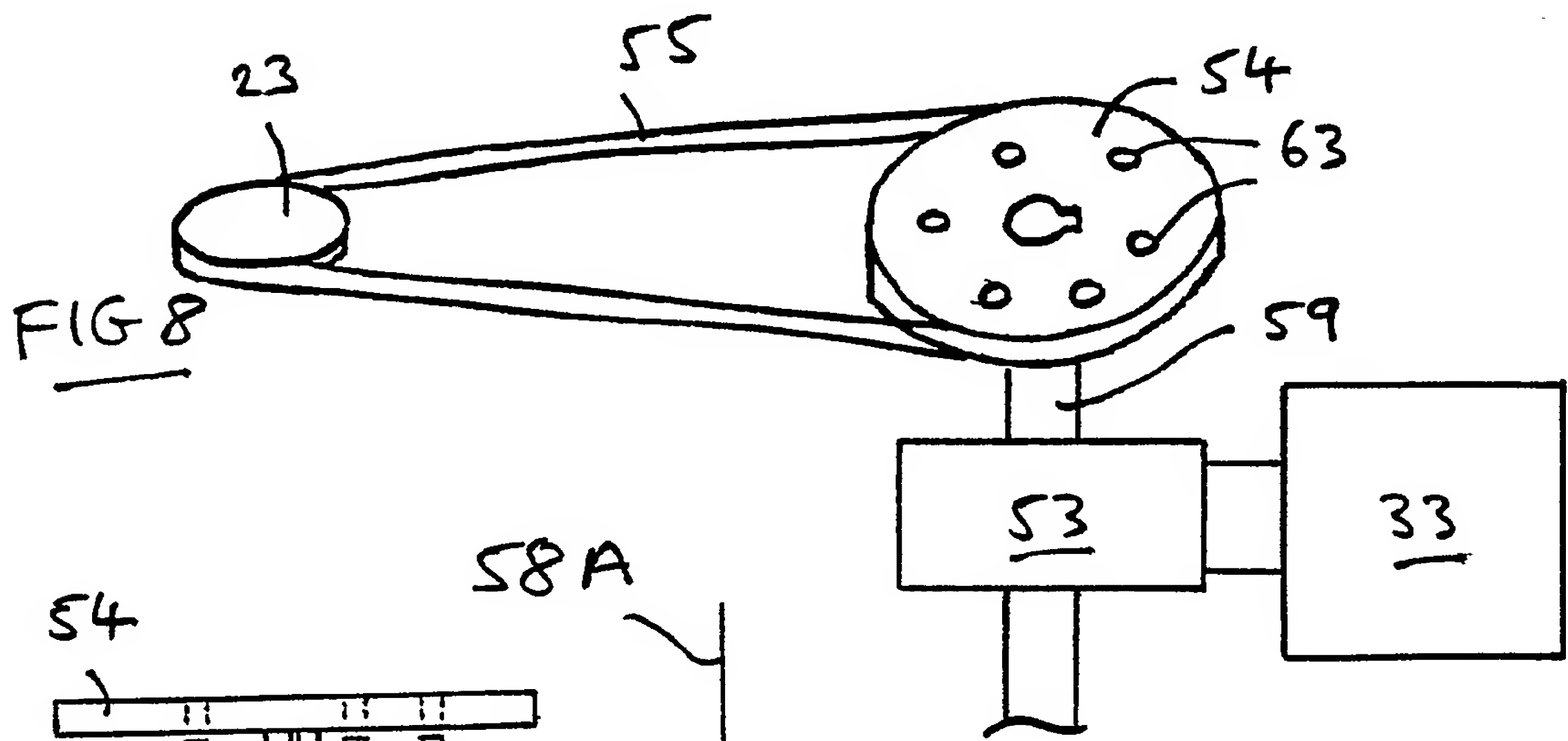
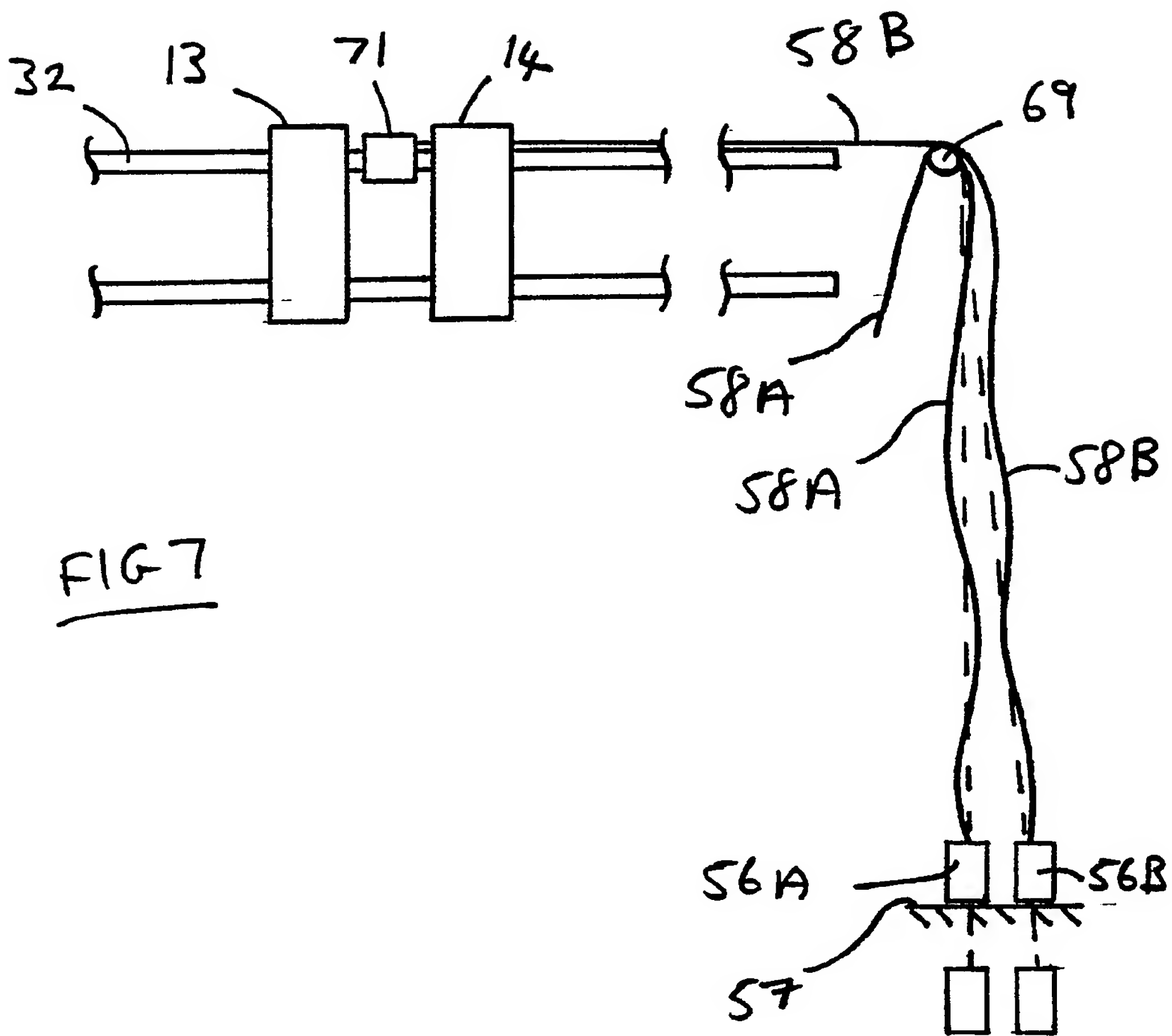


FIG 6



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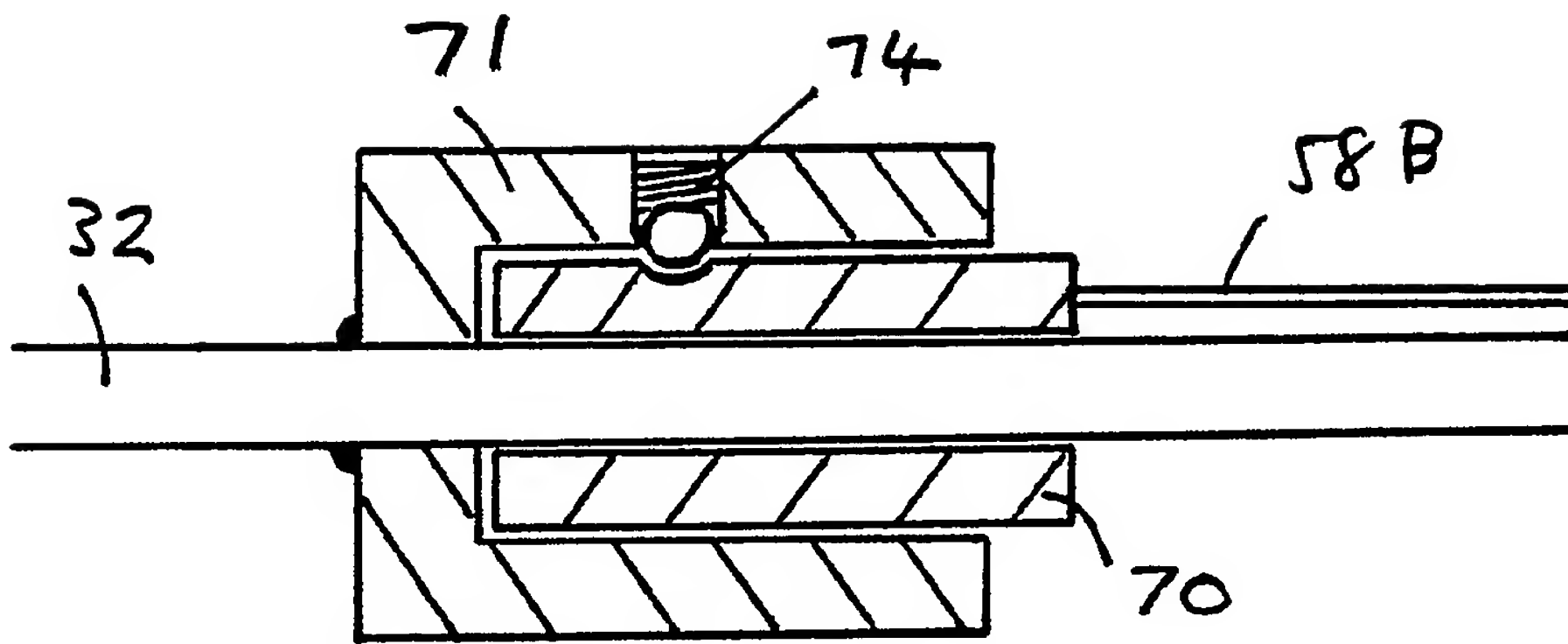


FIG 10

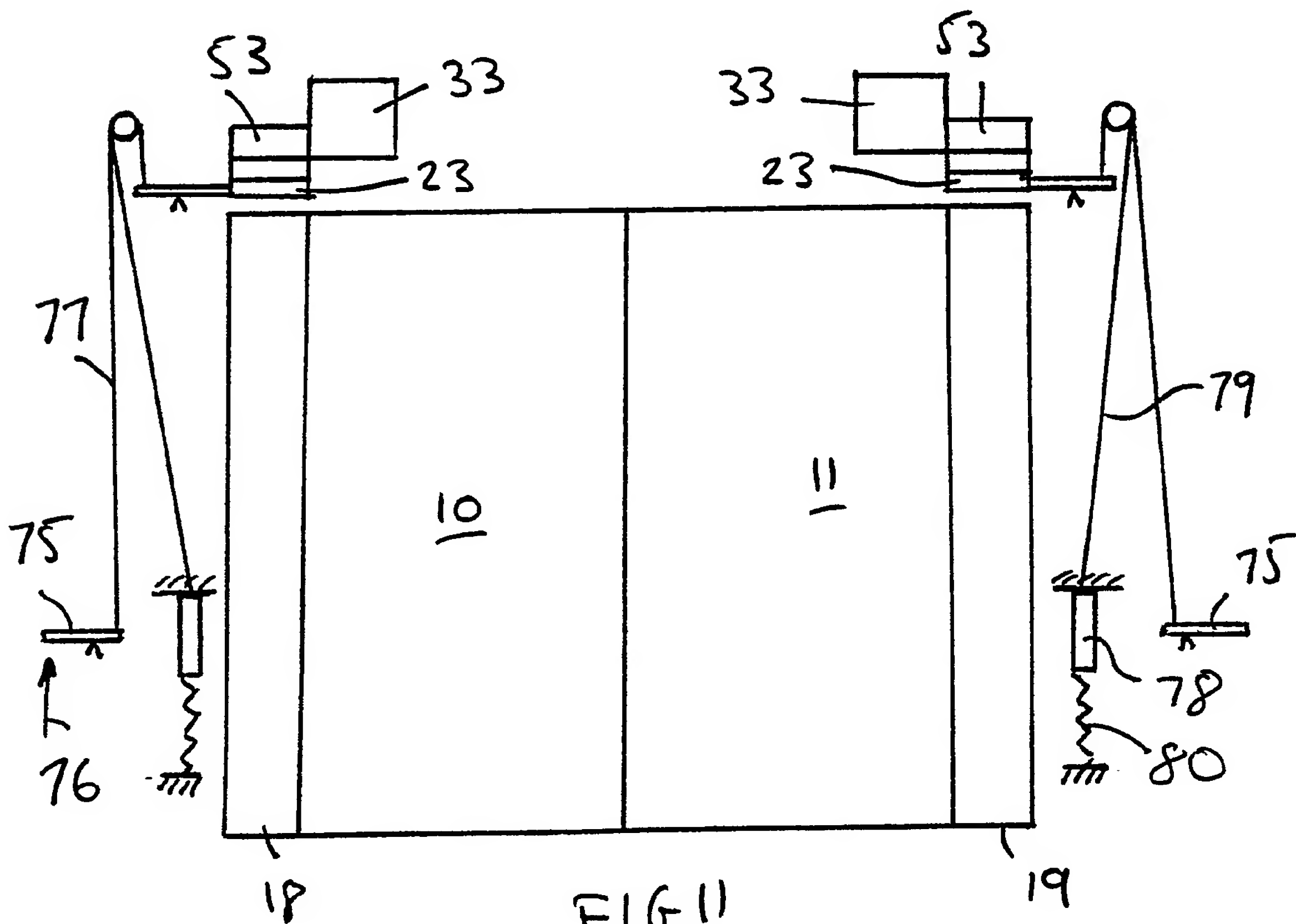


FIG 11

FLEXIBLE DOORS.

The present invention relates to door arrangements which include a flexible door member and a method of  
5 operating such door arrangements.

According to one aspect of the present invention, a door arrangement includes a flexible door member movable between a first position in which the door member at least  
10 partially covers an opening and a second at least partially retracted position, the arrangement including a first power means arranged, in use, to move the door member in at least one direction between the first and second positions and a second power means arranged, in  
15 use, to move the door member from the first to the second position.

With such an arrangement, should the first power means fail then it may nevertheless still be possible to  
20 move the door member from the first to the second position with the second power means to enable escape through the door, for instance in case of a fire.

The first power means may be arranged, in use, to be  
25 disconnected from the door member to assist in enabling the door member to be moved from the first to the second position.

According to another aspect of the present invention,  
30 a door arrangement includes a flexible door member movable between a first position in which the door member at least partially covers an opening and a second at least partially retracted position, the arrangement including a first power means arranged, in use, to move the door  
35 member in at least one direction between the first and



second positions, the power means being arranged, in use,  
to be disconnected from the door member to assist in  
enabling the door member to be moved from the first  
position to the second position in the absence of power  
5 from the first power means.

With such an arrangement, should there be a power  
failure then it will still be possible to open the door  
sufficiently for a person to get through even though the  
10 connection of the power means may normally afford a  
resistance to attempted manual opening such as to make  
manual opening difficult or impossible.

Second power means may be provided which are  
15 arranged, in use, to move the door member from the first  
to the second position.

The second power means may be arranged to assist the  
first power means in moving the door from the first  
20 towards the second position.

The arrangement may include a separable mechanical  
connection between the first power means and the door  
member. The mechanical connection may comprise a pair of  
25 relatively movable transmission members arranged to occupy  
a first configuration, in which one transmission member  
may rotate relative to the other and a second  
configuration in which the transmission members are  
constrained to rotate together, at least one of the  
30 members being arranged to be moved from the second to the  
first configuration by causing relative movement between  
the members, for instance relative axial movement.

The first power means may be arranged to be manually  
35 disconnected from the door member. The separable

mechanical connection may be arranged to be spaced or remote from manually operable means arranged to effect the disconnection.

5           The manual disconnection of the first power means may be achieved by an accessible disconnection actuator for instance accessible without first removing any part or accessible by a person standing on the floor.

10           A disconnection means may be arranged to disconnect the first power means from the flexible door, and the disconnection means may be a quick release disconnection means.

15           The disconnection means may include a manually operable lever. Alternatively or additionally, the disconnection means may include a weight which is arranged to be caused to move downwardly to actuate the disconnection means. Alternatively or additionally the  
20           disconnection means may be arranged to be activated when there is a loss of power, such as electrical power.

The disconnection means may be resettable.

25           The second power means may be arranged to act on an upper portion of the flexible door.

30           The second power means may include an abutment arranged to slide with part of the flexible door when moving from the first to the second position under the influence of the second power means. The flexible door member may be arranged to move relative to the abutment when the door member is moving between the first and second positions under the power of the first power means.

The abutment may be arranged to be released from an inoperative position upon application of sufficient force.

5       The operation of the second power means may be arranged to be initiated manually. The actuator for the operation of the second power means may be achieved by an accessible actuator, for instance by an actuator accessible without removing any part or accessible by a person standing on the floor.

10

      The second power means may comprise resilient means and those means may be arranged to act on a rotatable member onto which the flexible door member may be arranged to be wound.

15

      The abutment may be spaced or remote from manually operated means arranged to initiate operation of the second power means. Quick initiation means may be arranged to instigate operation of the second power means.  
20   The quick initiation means may comprise a weight which is arranged to be caused to move downwards to provide power for the second power means. The quick initiation means may be resettable.

25       The arrangement may include a pair of flexible door members arranged to move relative to each other away from each other when moving from the first to the second positions and arranged to move, in relation to each other, towards each other when moving from the second to the  
30   first position.

      The pair of door members may be arranged to move at the same time.

The second power means may be arranged to act directly on one door member and indirectly on the other door member. Where the power for the second power means is provided by a weight moving downwardly, each door may  
5 be arranged to move away from a fixed point between the doors at the same rate as the downwards movement of the weight.

The first power means may be arranged to be  
10 disconnected from both door members.

According to a further aspect of the present invention a method of operating a door comprises moving the door between a first position in which the door member  
15 at least partially covers an opening and a second, at least partially retracted position, the door being moved in at least one direction between the first and second positions by a first power means, the method also comprising operating a second power means, when the first  
20 power means is inoperative, to move the door member from the first to the second position.

The method may comprise disconnecting the first power means from the door member when the door member is being  
25 moved from the first to the second position under the power of the second power means.

According to another aspect of the present invention a method of operating a door arrangement comprises moving  
30 a flexible door member from a first position in which the door member at least partially covers an opening to a second at least partially retracted position and moving the door member in at least one direction between the first and second positions by first power means and

disconnecting the first power means from the door member  
when power to the first power means fails.

5       The method may comprise using second power means to  
move the door member from the first to the second position  
when the first power means has been disconnected from the  
door member.

10       The method may comprise effecting a mechanical  
disconnection between the first power means when power  
fails.

15       The method may comprise effecting the mechanical  
disconnection manually at a region spaced from the  
mechanical disconnection.

      The method may comprise resetting the second power  
means after operation.

20       The method may comprise initiating operation of the  
second power means manually.

25       The method may comprise operating quick initiation  
means to instigate operation of the second power means.  
The initiation means may comprise causing a weight to move  
downwardly to provide the power for the second power  
means.

30       The present invention also includes a method of  
opening a pair of flexible door members by moving them  
away from each other when moving from the first to the  
second position and moving them towards each other when  
moving them from the second to the first positions.

The method may comprise causing the second power means to act directly on one door member and indirectly on the other door member.

5       The method may comprise the first power means being disconnected from both door members.

The present invention also includes a method of operating a door arrangement as herein referred to.

10

The present invention includes any combination of the herein referred to features.

15       The present invention may be carried into practice in various ways but several embodiments will now be described by way of example with reference to the accompanying drawings, in which:-

20       Figure 1 is a schematic front view of a pair of flexible door panels 10 and 11 which can be wound towards or away from each other to open or close a doorway 12;

Figure 2 is a schematic sectional plan view taken on the lines 2-2 of Figure 1;

25

Figure 3 is a detailed front view of the operational part of the door 10 in the region designated 3 in Figure 1;

30       Figure 4 is a schematic perspective view of the mechanism whereby the door 10 can be powered to the open or closed position;

35       Figure 5 is a front view of the sliding members 13 and 14 which power portions of the door 10;

Figure 6 is a schematic plan view of a plate 42 showing the cooperation of a cap screw 46 with a slot 47 to control the winding up of the flexible door panel, and

5        Figure 7 is a schematic front view showing one embodiment of an emergency release mechanism for the door;

Figure 8 is a schematic perspective view showing the form of the drive motor sprocket;

10

Figure 9 is a schematic side view of the mechanism which allows the drive motor sprocket to be quickly disengaged from the drive motor;

15        Figure 10 is a detailed cross sectional view showing how normally engaged parts can be released from each other by the mechanism shown in Figure 7, and

20        Figure 11 is a schematic front view of a pair of door panels which can be opened automatically upon actuation of a lever or upon a power failure.

As shown in Figures 1 and 2, two flexible door panels 10 and 11 are provided which can be pulled off drums extending upwardly on either side of the doorway 12 to meet in the middle, or rolled back onto the drums to open the doorway. As shown in Figure 2, each door comprises a pair of spaced flexible panels 15 and 16 which are connected together at their free ends by a safe edge 17, with each panel being able to be wound onto or off an associated drum 18 and 19 respectively. The drums 18 and 19 of each door have side by side meshing gears 20 (shown in Figure 3) at a region above their extent whereby, by powering one gear 20 associated with one of the drums in

25

30



one direction, the other drum is caused to rotate in the opposite direction.

5       The doorway 12 is located on the outside of a building and accordingly, when the wind blows in the direction shown by arrows 21 in Figure 2, the outer panel 15 will tend to deflect inwardly, as shown in chain lines, to cause "bagging" of the panel. If that inwards movement were unchecked then, if the safe edges 17 were powered  
10 back, the panels would tend to become trapped between the safe edge and the drums without the panel being fully wound back onto the drum. Alternatively or additionally, excessive inwards movement of the panel 15, when the doors are closed, will pull the safe edges away from each other  
15 or pull an excessive amount of the panel off the drum. To assist in limiting the bagging of the panel, both in the fully closed position and when the door is being opened, a wind bar 22 is provided between the panel 15 and 16 with the bar 22 being located approximately halfway between the  
20 safe edge 17 and the drums 18 and 19 regardless of whether the doors are fully or partially open. Each wind bar is powered away from and towards the associated drum, as are the safe edges in a manner to be described below.

25       The wind bars 22 and the safe edges 17 are powered between an open and closed position by a motor 33 shown schematically in Figure 3 which engages a driven cog 23 to cause clockwise or anticlockwise rotation of coaxial grooved wind bar and safe edge drums 24 and 25  
30 respectively. A chain may extend around the corresponding cog associated with the drums of the other door to enable synchronised operation of both doors from a single motor. In an alternative embodiment, shown in Figures 8 and 9 and described in more detail below, the motor 33 is connected  
35 to the driven cog 23 by a gear box 53, a drive motor



sprocket 54 and a chain 55. As shown in Figure 4, a wind bar cable 26 is wound around the wind drum a few turns (to ensure that the cable will not slip on the drum) with a loop of that cable extending around a free running pulley 27. Although the cable 26 is designed not to stretch it is inevitable that, in use, a small amount of stretch will occur and accordingly each end of the cable is attached to a different end of a tension spring 55 such that, should stretching of the cable occur, that will be taken up by the spring contracting slightly. Similarly a safe edge cable 28 is wound around the safe edge drum 25 with a loop of that cable passing around a pulley 29 and with the ends of the cable being secured to opposite ends of a spring 30.

15

The diameter of the safe edge drum 25 is twice that of the wind bar drum 24 and accordingly the straight extent of the safe edge cable 28 will move at twice the speed of the wind bar cable 26. The edge cable 28 and the wind cable 26 are secured to the safe edge carriage 14 and the wind bar carriage 13 respectively, as shown in Figure 5.

25 The safe edge carriage 14 is guided by a pair of linear roller bearings 31 which slide on spaced parallel bars 32. Any tendency for the safe edge and the associated carriage to twist about the bars 36 is resisted by rollers 34 located on an extension 35 of the carriage which abut with the underside of one of the bars 32 and 30 the top of one of the bars 36 for the other carriage. Similarly, the wind bar carriage is guided by a pair of linear roller bearings 37 with rollers 38 on an extension 39 resisting twisting of the wind bar or the carriage.

When the door 10 is in the open position, the two carriages will overlap each other partially with the extension 39 of the wind carriage extending alongside the carriage 14 and the extension 35, when viewed from the front. Similarly the extension of the safe edge carriage of the other door 11 is located between the bars 36 such that the extension of safe edge carriages from each door can overlap each other.

Each drum 18 and 19 is connected to a keyed bullet shaft 40 (which is constrained to rotate with the drive cog 23) via a torsional spring 41. The spring 41 is fixed at its upper end to a plate 42, and that plate is welded to the upper end of the drum 18. The lower end of the spring is fixed to a disc 43 which is welded to a shaft 44 into which the bullet shaft extends such that the two shafts are constrained to rotate with each other. A pair of spaced parallel bearings 54 are provided between the shaft 44 and the drum 18 to permit relative pivotal movement. The lower end of the drum (not shown) is mounted in coaxial bearings to enable rotation of the drum.

The plate 42 is able to slide relative to an overlapping plate 45. Accordingly, considering the normal operation of the door, without wind loading, as the door is moved from the closed to the open position the diameter of the drum will increase as the panel is taken up, and accordingly the drum will undergo a slightly smaller degree of rotation than the shaft 40. However, the spring connection between the shaft 40 and the drum urges the drum to wind up with the sheet being in tension. However, if wind loading occurs during opening of the door that relative movement may be excessive thereby permitting bagging of the panel. To prevent such excessive movement,

a cap screw 46 fast with the plate 45 and the shaft 40 extends through an arcuate slot 47 in the plate 42, as shown in Figure 6.

5           During normal operation, to compensate for the increase in diameter of the drum as the door is wound on to it, the cap screw moves relative to the plate 42 through the distance "x", which may be, for example, 12 mm. When the door is closed and wind is blowing on the  
10 panel 15 to tend to unwind the panel from the drum, the panel may be permitted to unwind, against the action of the spring which maintains the panel in tension, until the cap screw abuts the end 48 of the slot. Further relative movement in that direction is then prevented and the  
15 bagging is restricted. When the sheet is wound in, even if the wind force on the panel is considerable, excessive bagging is prevented and the cap screw is either brought into engagement with the end 48, or maintained in engagement to provide a positive wind up drive for the  
20 drum.

The provision of the cap screw and socket which permit restricted relative rotational movement between the drum and drive shaft enables phenomenal operating speeds  
25 to be achieved, and the safe edge of the doorway may move at 1m/s.

In order to remove a drum, for instance for maintenance, the bullet shaft 40 can be withdrawn from the socket in the shaft 44 by turning a threaded key 49.  
30 Thereafter the drum can be pivoted clear of the upper assembly and lifted out of the rotational bearing assembly at the bottom. Attachment of the drum to the drive assembly is a reverse of that procedure.

In the event of a power failure, for instance if there is an emergency in the case of a fire which cuts off the power supply, or during a power cut it is desirable to be able to open the door either by being able to push the door panels 10 and 11 away from each other or by enabling the doors to open by themselves without an electrical supply.

Figure 7 shows, in solid lines, the position of release weights 56A and 56B when the door is operating in a conventional manner. In that position, the weights 56A and 56B rest on a support 57. The support 57 is arranged to be removed suddenly to allow the weights to fall to the position shown in chain lines. In that position the slack in cables 58A and 58B which are connected to the weights is taken up and a sudden jerk is applied to the cables. The support 57 may be removed by smashing a glass cover, for instance, or in any other convenient way.

When the cables are jerked either the motor is disconnected from the driven cog to allow the door panels to be pushed open or the carriages are pulled open by the continued descent of the weight or both those events occur. Alternatively or additionally, the carriages may have a force exerted on them by the weight in the direction of opening thereby reducing the manual force required to push the doors open.

Figures 8 and 9 show how the motor is disconnected from the driven cog 23. Referring to Figure 8, the gearbox 53 has an output shaft 59 upon which a locking plate 60 is able to slide in an axial direction but is constrained to rotate with the shaft 59 by splines 61. When the shaft 59 is in driving engagement with the sprocket 54, upwardly projecting lugs 62 on the plate 60

extend into aligned openings 63 on the sprocket 54. The lower end of the plate 60 has a skirt 64 which is surrounded by an axially movable but rotationally fast ring 65. A bearing assembly 66 is located between the  
5 ring 65 and the skirt 64. Downwards movement of the ring 65 causes the plate to be moved downwardly on the shaft 59 to disengage the lugs 62 from the openings 63. That disengagement is caused by a pivotally mounted release arm 62. One end of the arm is pivotally connected to the ring  
10 65 and the other end of the arm is connected to the cable 58A.

The cable 58A passes around a pulley 69 at the top of the door assembly. A sharp jerk in the cable 58A causes  
15 the right hand side of the arm 67 to be moved up, and the left hand side to be moved down thereby moving the skirt and plate down and tugging the lugs out of the openings in the sprocket.

20 If desired, the arm could be operated manually instead of relying upon the weight 56A falling and jerking the cable.

With the sprocket 54 disengaged from the motor either  
25 or both of the safe edges can be pushed away from each other or pulled towards each other with relative ease. Of course urging of one of the safe edges to open or close the door panels causes opening or closing of the other panel because of the interlinking of the carriages. In  
30 the direction of opening, the fabric of the panels is in tension and that force will reduce the effort required to open the doors.

To reconnect the motor to the driven sprocket  
35 relative rotation between the sprocket 54 at the plate 60

occurs until the openings of one are aligned with the lugs of the other whereupon the plate is urged upwardly. If the device has been operated by the weight 56A having fallen then the weight must first be replaced on the support 57.

Referring now to Figures 7 and 10, and to the previous figures, the carriages 13 and 14 normally move along the rails in response to the tension in the cables 28 and 26. Located between the carriages, and mounted on the top slide rail 32 is a slider 70.

The slider 70 takes no part in normal door operation and is retained in position within a sleeve 71 which is fixed to the rail 32. However, the slider 70 is retained on the sleeve by a ball 72 which is urged into a recess 73 on the sleeve by a spring 74. When the weight 56B falls and jerks the cable 58B, the slider 70 is jerked away from the sleeve and the ball is caused to come out of the recess against the action of the spring. The slider then moves to the right on the rail, as the weight 56B falls below the position shown in chain lines, and abuts the carriage 14. The force of the weight then acts, via the slider 70 on the carriage to make the doors very easy to open manually or, if desired, to cause the slider 14 to move to the right and thereby open both door panels automatically. It will be appreciated that, for each length of drop for the weight 56B, when the slider abuts the carriage, the gap between the doors is increased by twice that distance as both panels open. Accordingly for a drop of only 1 or 1.5 m the doors can open 2 or 3 m.

The slider 70 is reset by putting the weight 56B back on the support and ramming the slider 70 back into the sleeve 71 to relocate the ball 72 in the recess 73.



The embodiment shown in Figure 11 is similar to the embodiments previously described. The door panels 10 and 11 can be caused to move partially towards an open position upon actuation of a lever 75 or upon power failure, either of which mechanism can be incorporated alone and either or both of which can be incorporated in the door previously described, with or without the previously described mechanism.

10 In the arrangement shown in Figure 11 each drum 18 and 19 is associated with its own motor 33, gearbox 53 and driven cog 23 which can be disconnected from the gearbox as previously described in relation to Figures 8 and 9.

15 If the lever 75 is pushed upwardly in the direction shown by the arrow 76 then the driven cog 23 is pulled downwardly by a line 77 to disconnect the cog 23 from the drive. That disconnection allows the tension in the spring 41 within the drum to cause the drum to wind up the flexible door and open the door sufficiently for a person to pass through the door way.

A solenoid 78 is also connected to the driven cog 23 via a line 79. When the solenoid is energised the line 79 is held in an upwards position, against the action of a spring 80. When power fails then the solenoid is disengaged and the spring 80 pulls the line 79 downwardly to cause the cog 23 to be disconnected from the drive. The tension in the spring in the drum then automatically causes the door to be wound up sufficiently for a person to pass through.

Reconnection of the cog 23 to the drive is as previously described.

A lever 75 and a solenoid 78 may be provided at each side of the door to disconnect the drive from each motor. Alternatively or additionally a single lever 75 or solenoid 78 may be arranged to disconnect the cog at each  
5 side from the drive.

As the arrangement of Figure 11 has separate drives for each door there is less friction in the drive mechanisms for the free edges of the doors thereby  
10 permitting the springs within each driven to at least partially open more easily and quickly.



CLAIMS

1. A door arrangement including a flexible door member  
movable between a first position in which the door member  
5 at least partially covers an opening and a second at least  
partially retracted position, the arrangement including a  
first power means arranged, in use, to move the door  
member in at least one direction between the first and  
second positions and a second power means arranged, in  
10 use, to move the door member from the first to the second  
position.

2. An arrangement as claimed in Claim 1 in which the  
first power means are arranged, in use, to be disconnected  
15 from the door member to assist in enabling the door member  
to be moved from the first to the second position by the  
second power means.

3. A door arrangement including a flexible door member  
20 movable between a first position in which the door member  
at least partially covers an opening and a second at least  
partially retracted position, the arrangement including a  
first power means arranged, in use, to move the door  
member in at least one direction between the first and  
25 second positions, the power means being arranged, in use,  
to be disconnected from the door member to assist in  
enabling the door member to be moved from the first  
position to the second position in the absence of power  
from the first power means.

30 4. An arrangement as claimed in Claim 3 in which second  
power means are provided which are arranged, in use, to  
move the door member from the first to the second  
position.

35

5. An arrangement as claimed in Claim 4 or Claims 1 and 2 in which the second power means are arranged to assist the first power means in moving the door from the first position towards the second position.

5

6. An arrangement as claimed in any preceding claim including a separable mechanical connection between the first power means and the door member.

10 7. An arrangement as claimed in Claim 6 in which the mechanical connection comprises a pair of relatively movable transmission members arranged to occupy a first configuration in which one transmission member may rotate relative to the other and a second configuration in which  
15 the transmission members are constrained to rotate together, at least one of the members being arranged to be moved from the second to the first configuration by causing relative movement between the members.

20 8. An arrangement as claimed in Claim 7 in which the relative movement between the members comprises relative axial movement.

9. An arrangement as claimed in any preceding claim in  
25 which the first power means are arranged to be manually disconnected from the door member.

10. An arrangement as claimed in Claim 9 in which the separable mechanical connection is arranged to be spaced  
30 from, or remote from the manually operable means arranged to effect the disconnection.

11. An arrangement as claimed in any of Claims 6 to 10 in which the manual disconnection of the first power means is  
35 achieved by an accessible disconnection actuator.

12. An arrangement as claimed in any preceding claim in which a disconnection means is arranged to disconnect the first power means from the flexible door.

5 13. An arrangement as claimed in Claim 12 in which the disconnection means are a quick release disconnection means.

10 14. An arrangement as claimed in Claim 12 or 13 in which the disconnection means include a manually operable lever.

15 15. An arrangement as claimed in any of Claims 12 to 14 in which the disconnection means includes a weight which is arranged to be caused to move downwardly to actuate the disconnection means.

16. An arrangement as claimed in any of Claims 12 to 15 in which the disconnection means is arranged to be actuated when there is loss of power.

20 17. An arrangement as claimed in any of Claims 12 to 16 in which the disconnection means is resettable.

25 18. An arrangement as claimed in any preceding claim in which the second power means is arranged to act on an upper portion of the flexible door.

30 19. An arrangement as claimed in any preceding claim in which the second power means includes an abutment arranged to slide with part of the flexible door when moving from the first to the second position under the influence of the second power means.

35 20. An arrangement as claimed in Claim 19 in which the flexible door member is arranged to move relative to the

abutment when the door member is moving between the first and second positions under the power of the first power means.

5     21. An arrangement as claimed in either of Claims 19 or 20 in which the abutment is arranged to be released from an inoperative position upon application of sufficient force.

10    22. An arrangement as claimed in any preceding claim in which the operation of the second power means is arranged to be initiated manually.

15    23. An arrangement as claimed in Claim 22 in which the actuator for the operation of the second power means is achieved by an accessible actuator.

20    24. An arrangement as claimed in any preceding claim in which the second power means comprises resilient means.

25    25. An arrangement as claimed in Claim 24 in which the resilient means are arranged to act on a rotatable member onto which the flexible door member is arranged to be wound.

30    26. An arrangement as claimed in any of Claims 19 to 21 or any of Claims 22 to 25 when dependent upon Claims 19 to 21 in which the abutment is spaced or remote from manually operated means arranged to initiate operation of the second power means.

35    27. An arrangement as claimed in Claim 26 in which quick initiation means are arranged to instigate operation of the second power means.

28. An arrangement as claimed in Claim 27 in which the quick initiation means comprises a weight which is arranged to be caused to move downwards to provide power to the second power means.

5

29. An arrangement as claimed in either of Claims 27 or 28 in which the quick initiation means are resettable.

10 30. An arrangement as claimed in any preceding claim including a pair of flexible door members arranged to move relative to each other away from each other when moving from the first to the second positions and arranged to move, in relation to each other, towards each other when moving from the second to the first position.

15

31. An arrangement as claimed in Claim 30 in which the pair of door members are arranged to move at the same time.

20 32. An arrangement as claimed in either of Claims 30 or 31 in which the second power means are arranged to act directly on one door member and indirectly on the other door member.

25 33. An arrangement as claimed in Claim 32 in which, when the power for the second power means is provided by a weight moving downwardly, each door is arranged to move away from a fixed point between the doors at the same rate as the downwards movement of the weight.

30

34. An arrangement as claimed in either of Claims 32 or 33 in which the first power means are arranged to be disconnected from both door members.

35. A door arrangement substantially as herein described with reference to, and as shown in any of the accompanying drawings.

5 36. A method of operating a door comprising moving the door between a first position in which the door member at least partially covers an opening and a second, at least partially retracted position, the door being moved in at least one direction between the first and second positions  
10 by a first power means, the method also comprising operating a second power means, when the first power means is inoperative, to move the door member from the first to the second position.

15 37. A method as claimed in Claim 36 comprising disconnecting the first power means from the door member when the door member is being moved from the first to the second position under the power of the second power means.

20 38. A method of operating a door arrangement comprising moving a flexible door member from a first position in which the door member at least partially covers an opening to a second at least partially retracted position and moving the door member in at least one direction between  
25 the first and second positions by first power means and disconnecting the first power means from the door member when power to the first power means fails.

30 39. A method as claimed in Claim 38 comprising using second power means to move the door member from the first to the second position when the first power means has been disconnected from the door member.

35 40. A method as claimed in either of Claims 36 or 37 or Claim 39 comprising the second power means assisting the

first power means in moving the door member from the first to the second position.

41. A method as claimed in any of Claims 36 to 40  
5 comprising effecting a mechanical disconnection between the first power means when power fails.

42. A method as claimed in Claim 41 comprising effecting the mechanical disconnection manually at a region spaced  
10 from the mechanical disconnection.

43. A method as claimed in any of Claims 36, 37 or 40 to 42 comprising resetting the second power means after operation.

15

44. A method as claimed in any of Claims 36, 37 or 39 to 43 comprising initiating operation of the second power means manually.

20 45. A method as claimed in any of Claims 36 to 44 comprising operating quick disconnection means to instigate operation of the second power means.

25 46. A method as claimed in Claim 45 in which the initiation means comprises causing a weight to move downwardly to provide the power for the second power means.

30 47. A method as claimed in any of Claims 36 to 46 including opening a pair of flexible door members by moving them away from each other when moving from the first to the second position and moving them towards each other when moving from the second to the first position.



48. A method as claimed in Claim 47 comprising causing the second power means to act directly on one door member and indirectly on the other door member.

5 49. A method as claimed in either of Claims 47 or 48 comprising the first power means being disconnected from both door members.

10 50. A method of operating a door arrangement substantially as herein referred to with reference to, and as shown in the accompanying drawings.

15 51. A method as claimed in any of Claims 36 to 50 when operating a door arrangement as claimed in any of Claims 1 to 35.



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**Patents Act 1977**

**Examiner's report to the Comptroller under Section 17  
(The Search report)**

Application number  
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**Relevant Technical Fields**

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(ii) Int Cl (Ed.6) E05F, E06B

Search Examiner  
MR S CHURCH

Date of completion of Search  
14 MARCH 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-  
1, 2, 4-27, 39-51

**Categories of documents**

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| <b>X:</b> Document indicating lack of novelty or of inventive step.   | <b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.        |
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| <b>A:</b> Document indicating technological background and/or state of the art.   | <b>&amp;:</b> Member of the same patent family; corresponding document.   |

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2263729 A	(BOLTON BRADY LTD) see page 7 lines 2-14 in particular	1, 5, 26 & 40
X	GB 2257201 A	(GUTHRIE DOUGLAS LTD) see the paragraph spanning pages 4 and 5 in particular	1, 2, 36 & 37 at least
Y	GB 1497380 A	(JUNOD) see page 2 lines 108 to 14	1, 2, 4, 12, 13, 16, 17, 18, 22, 23, 30, 34, 36, 37, 39, 43-49
X	GB 1044133 A	(PETERS & CO) whole of document but note page 2 lines 90-97 in particular	1 & 36 at least
Y	GB 1008529 A	(CENTOR PRODUCTS) note the weights for urging the doors open	1, 2, 3, 6, 37 & 46 at least
Y	GB 0407494 A	(NEWMAN & SONS) note the releasable weight means for opening the doors	1, 2, 36, 32 & 46 at least
Y	GB 0407493 A	(NEWMAN & SONS) note the releasable weight means for opening the doors	1, 2, 36, 32 & 46 at least

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Continuation page

Category	Identity of document and relevant passages		Relevant to claim(s)
X	US 5134902 A	(HUNG) note the auxiliary drive device	1 & 36 at least
X	US 4904880 A	(YOSHIDA) note the secondary power source	1 & 36 at least
X	US 4797567 A	(PAPPAS) note the auxiliary power source	1 & 36 at least
X	US 3802123 A	(ATLAS) note the emergency door opening system	1, 19, 20, 21 & 36 at least